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The area under consideration lies to the southeast of the main proved oil and gas belt of the state. Six deep tests showed no oil and but four of them gas. It is to be noted, however, that not one of the six was drilled on a favorable structure.

Webster County, although possessing an immense amount of good coal, has but little commercial mining and no coke production. There are nineteen coal beds that appear to be workable commercially. The author estimates that the total recoverable tonnage present is about 5,144,000,000 tons.

Other minor resources include the following: (1) unutilized water power; (2) iron ore (possibly); (3) clay, not extensively utilized; (4) limestone the Hinton member of the Mauch Chunk and the Green Brier limestone; and (5) sandstone, suitable for building purposes in both the Pennsylvanian and Mauch Chunk.

The portion of the report devoted to paleontology includes some notes by W. Armstrong on invertebrate fossils from the Pottsville series. The following contributions are made:

1. "The Maximum Size of West Virginia Derbyas as Influenced by Sediments." The author concludes that the largest specimens of each species are to be found in the light-colored shales and the purer argillaceous limestones, the smallest in the fine black sediments.

2. "An Example of Shell Regeneration in *Derbya crassa*." This is an instance of abnormal shell growth repairing a probable break in the shell during the life of the animal.

3. "Notes on the Correlation of Certain Fossiliferous Members of the Pottsville Series." A discussion of the present uncertain status of the question is given. Some faunal lists are included.

4. "Fossiliferous Shale Beds in the Rowlesburg Section."

5. "Invertebrate Fossils Collected from the Pottsville Series of Webster County." In general the Pottsville of West Virginia shows three faunal types, a normal marine type, a restricted marine type, and a fresh-water type. Thirty-two species are listed, of which twenty-three are described and a number figured.

A. C. McF.

Bulletin No. 36, Illinois State Geological Survey. Yearbook for 1916, consisting of administrative report, and economic and geologic papers. Pp. 188, figs. 7, pls. 16, tables 33.

The report consists of four papers, the first of which is the administrative report of F. W. De Wolf, state geologist, for 1916. In Part II by N. O. Barrett, on the mineral resources of the state in 1916, the

author finds that while agriculture is the leading source of wealth, mineral industries are gradually gaining in importance. In 1916, Illinois ranked behind Pennsylvania and West Virginia only, in the total value of mineral production. It ranks first in the country in the production of fluorspar, sand and gravel, and tripoli, third in brick and tile, and coal, and fourth in petroleum, limestone, and clay products. An extensive bibliography is included.

Part III, "Clay Deposits Near Mountain Glen, Union County, Illinois," by Stuart St. Clair, describes the occurrence of a deposit of clay believed to be superior to the foreign product for the manufacture of graphite crucibles and glass pots. It is a bedded deposit, underlain by sand, and overlain by sand, gravel, and in some places by an iron-cemented conglomerate, the whole being covered by loess to varying depths. The base never has been determined by drilling. The sedimentary origin is evident. The area where it is was part of a great Cretaceous-Tertiary embayment. The existence of this deposit has been known for many years, but its development was delayed until the cutting-off of the importation of German refractory clays by the war. Four clay pits are now being worked.

Part IV, "The Structure of the La Salle Anticline," by Gilbert H. Cady. The La Salle Anticline is an asymmetric fold, extending south from La Salle to the oil fields of Crawford and Lawrence counties. It is bordered on either side by synclinal troughs, that on the east forming the northern part of the Indiana coal basin, and that on the west forming the larger and main portion of the Illinois coal fields. There are numerous minor structures. The stratigraphic section includes beds from the St. Peter sandstone through the Pennsylvanian. Several unconformities are described. These are at the base of the Chester and the Pennsylvanian, between the St. Peter sandstone and Platteville dolomite, between the Lower Magnesian limestone and the St. Peter sandstone, and several within the Pennsylvanian. The author suggests that there may be some possible relation between the anticline and the distribution of the areas of dolomitization in the Platteville formation.

Two structural contour maps of the area are given. The key beds used in mapping were the top of the St. Peter sandstone and No. 2 coal of the Pennsylvanian.

A. C. McF.

The White River Badlands. By CLEOPHUS C. O'HARRA. South Dakota School of Mines, Bull. No. 13. Rapid City, 1920.

This is a useful volume on the badlands of South Dakota. It outlines the development of knowledge concerning the region, its geology,

and paleontology. The volume is abundantly illustrated and both the formations and the fossils afford excellent material for this purpose. A full bibliography enhances the value of the volume.

R. D. S.

Mineral Resources of Michigan for 1914 and Prior Years. Prepared under the direction of R. C. ALLEN. With a treatise on Michigan copper deposits by R. E. HORE. Michigan Geological and Biological Survey, Publication No. 19, 1915.

Mineral Resources of Michigan for 1917 and Prior Years. Prepared under the direction of R. C. ALLEN. Michigan Geological and Biological Survey, Publication No. 27, 1918.

These volumes were not received until late in 1920. The noteworthy feature (besides the statistics on the copper and iron industries, as well as on the non-metallic minerals) is the presence in the 1914 number of a 150-page treatise on the Michigan copper deposits, by R. E. Hore. This article serves as an excellent summary of existing knowledge on these deposits, as well as giving the author's ideas on the subject. Hore believes the native copper is essentially a primary replacement deposit from solutions (probably carrying the copper as the chloride) which accompanied and followed the extrusion of the lavas. A feature of the work is the presence of some thirty photomicrographs of polished sections.

D J. F.

Field Methods in Petroleum Geology. By G. H. COX, C. L. DAKE, and G. A. MUILENBURG. First edition, pp. xiv+305. McGraw-Hill Book Company, Inc., 1921. \$4.00.

Petroleum geologists, particularly those who are lacking in field experience, will welcome this book. It treats chiefly of the recognition of structural features favorable for the accumulation of petroleum, and of map-making and the instruments used in making maps. It includes the solution of geologic problems and the making of a geologic report. Problems of a "resident geologist" are not included. Graphic solutions of geologic problems are also omitted. It is assumed that the reader has a knowledge of the fundamental principles of geology and mathematics, including trigonometry.

Chapter I contains a description of the large variety of instruments used by geologists, and Chapter II outlines instrumental methods in